

IRRADIATION AS AN ALTERNATIVE TO METHYL BROMIDE
QUARANTINE TREATMENT FOR PLUM CURCULIO IN BLUEBERRIES

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Blueberries shipped from the United States east of the Rocky Mountains to California must be subjected to a disinfection treatment for plum curculio, Conotrachelus nenuphar (Herbst), as well as blueberry maggot, Rhagoletis mendax, Curran. Although blueberries are not a good host of plum curculio, it was reported infesting blueberries in the field (Mampe & Neunzig 1967), and in our research we found two large plum curculio larvae emerging from one liter of unripe blueberries subjected to plum curculio oviposition. Methyl bromide fumigation is the only disinfection treatment currently used or approved for use on blueberries. Miller et al. (1994) found that blueberries (cv. Climax) would tolerate irradiation of 750 Gy. From work with other tephritids, it can be surmised that an irradiation quarantine treatment against blueberry maggot should be possible given a maximum dose limitation of 750 Gy (Burditt 1994). However, curculionids typically require higher doses than tephritids to achieve sterilization (Hallman & Sharp 1994). Also, a treatment for plum curculio must be effective against all life stages, not just eggs and larvae as in the case of fruit flies. To achieve a minimum dose in the center of a load of irradiated fruit the outside fruits receives 2.5-3 times the minimum dose. Therefore, if a minimum dose of, say, 300 Gy is established for the plum curculio, part of the blueberry load may receive up to 900 Gy, and the berries must tolerate that maximum dose.

At this early stage in irradiation of plum curculio research, it seems that a dose can be found that will ensure quarantine security (usually set at 'probit 9' or 99.9968% efficacy) of plum curculio without significant damage to blueberries. It would not kill all plum curculios that might be present, but would render them incapable of reproduction. However, this dose must be confirmed by treating a large number of insects and would fail if a few fertile plum curculios were found after several thousand were successfully treated. If a higher dose is required, additional research on blueberry tolerance to irradiation may be necessary; the next highest dose after 750 Gy tested on blueberries by Miller et al. (1994) was 1,500 Gy, and blueberry quality was generally lower than at 750 Gy.

References

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